We claim:

1. A continuous process for removing radioactive thorium from an aqueous solution comprising:

providing a quantity of ion exchange resin which is selective for binding thorium, and

passing the aqueous solution through the quantity of ion exchange resin at a substantially constant flow rate,

wherein, the quantity of the ion exchange resin and the substantially constant flow rate combine to provide an average residence time for a thorium ion in the quantity of ion exchange resin which is greater than the average time required for radioactive decay of the thorium ion.

2. The continuous process of claim 1, wherein the ion exchange resin is selective for binding thorium over uranium, protactinium and any other metal ion contained in the aqueous solution.

3. The continuous process of claim 1, further comprising the addition of complexing agents to the aqueous solution prior to passing the aqueous solution through the quantity of ion exchange resin to bind thorium complexing ions present in the aqueous solution.

4. The continuous process of claim 1, further comprising the dilution of the aqueous solution with water prior to passing the aqueous solution through the quantity of ion exchange resin.

5. The continuous process of claim 1, further comprising removing organic material from the aqueous solution prior to passing the aqueous solution through the quantity of ion exchange resin.

6. The continuous process of claim 1, further comprising adjusting the acid or base content of the aqueous solution prior to passing the aqueous solution through the quantity of ion exchange resin in order to prevent degradation of the quantity of ion exchange resin.

7. The continuous process of claim 1, wherein the aqueous solution is an effluent from a solvent extraction uranium purification process.

8. The continuous process of claim 7, further comprising a step of diluting the effluent from the solvent extraction uranium purification process with water prior to the passing of the diluted effluent through the quantity of ion exchange resin.

9. The continuous process of claim 8, wherein the amount of water used in the step of diluting is a sufficient amount to reduce the concentration of nitric acid in the diluted effluent to 1.0 molar or less.

10. The continuous process of claim 8, further comprising removing organic material from the effluent or diluted effluent prior to passing the diluted effluent through the quantity of ion exchange resin.

11. The continuous process of claim 10, wherein the organic material is removed by filtering.

12. The continuous process of claim 11, wherein the organic material is removed by filtering and passing the filtered effluent or filtered diluted effluent through activated charcoal.

13. The continuous process of claim 10, wherein the organic material is removed by passing the effluent or diluted effluent through activated charcoal.

14. The continuous process of claim 10, further comprising the addition to the effluent or diluted effluent of complexing agents for binding thorium complexing ions present in the effluent or diluted effluent, wherein the addition of complexing agents occurs prior to passing the diluted effluent through the quantity of ion exchange resin.

15. The continuous process of claim 14, wherein the complexing agent binds fluoride, thereby reducing thorium-fluoride complexes in the effluent or diluted effluent.

16. The continuous process of claim 15, wherein the complexing agent is aluminum.

17. A continuous process for removing radioactive thorium from an aqueous solution comprising:

providing a quantity of ion exchange resin which is selective for binding thorium and has a finite thorium binding capacity, and

passing the aqueous solution through the quantity of ion exchange resin at a substantially constant flow rate and in an amount which contains more thorium than the thorium binding capacity of the ion exchange resin,

wherein, the quantity of the ion exchange resin and the substantially constant flow rate combine to provide an average residence time for a thorium ion in the quantity of ion exchange resin which is greater than the average time required for radioactive decay of the thorium ion.